# Classification of Woodland Caribou in the Central Mackenzie Mountains, Northwest Territories, August 1999

Northwest Territories Resources, Wildlife & Economic Development

103-06760/

# CLASSIFICATION OF WOODLAND CARIBOU IN THE CENTRAL MACKENZIE MOUNTAINS, NORTHWEST TERRITORIES, AUGUST 1999

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2000

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SAHTU REGION – GOVERNMENT OF THE NORTHWEST TERRITORIES
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Manuscript Report No. 122

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## ABSTRACT

A population composition survey of woodland caribou (*Rangifer tarandus caribou*) was done on the ground on the east side of the Tsezotene Range of the central Mackenzie Mountains (63° 24' N, 126° 35' W) on 07 August 1999. An estimated 5000 caribou were in the study area, of which 2659 animals were classified: 661 males (24.9%), 1562 females (58.7%), and 438 calves (16.5%). This gives estimated age and sex ratios of 28 calves and 43 bulls per 100 cows, respectively. The calf: cow ratio is comparable to low estimates documented in rutting range aerial classification surveys of woodland caribou in the South Nahanni area in the southern Mackenzie Mountains during 1995 to 1997. Recent summer-fall calf: cow ratios in the Mackenzie Mountains, NWT are below a threshold of 30 calves per 100 cows set by biologists in the Yukon for fall classification surveys of woodland caribou and may be indicative of declining numbers in the Mackenzie Mountains, NWT.

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# INTRODUCTION

Woodland caribou (*Rangifer tarandus caribou*) occur across the Mackenzie Mountains, which straddle the Northwest Territories (NWT) and the Yukon Territory. Woodland caribou in the Mackenzie Mountains are also commonly called mountain caribou. These caribou are an important resource for subsistence hunters (primarily from Tulita and Wrigley), resident hunters (primarily from Norman Wells and Fort Simpson), and non-resident hunters who hunt with the eight licenced big game outfitters operating in the region.

Our estimated total annual harvest of woodland caribou in the Mackenzie Mountains, NWT is 270-320 animals: 170 by non-residents (Veitch and Simmons 1998), 20 by residents, and 80-130 by subsistence harvesters. Since the Mackenzie Mountains were opened to non-resident and resident harvests in 1965 (Simmons 1968; Murphy 1976), the estimated subsistence harvest has dropped to current levels from an estimated 216 caribou in 1964 (Collin 1983). Woodland caribou have become the second-most sought after species, after Dall's sheep (*Ovis dalli dalli*), by non-resident hunters in the Mackenzie Mountains (Veitch and Simmons 1998). The annual harvest of woodland caribou by non-residents averaged 44 during 1965-68, 96 during 1976-79, and 171 during 1991-97 (Collin 1983; Veitch and Simmons 1998). Non-resident hunting in the Mackenzie Mountains, NWT currently provides an estimated annual revenue of $1.8 million to individuals, businesses, and governments in the territory (Crapo 1997).

However, despite the considerable economic and subsistence importance of woodland caribou in the Mackenzies, and in comparison to research on barren-ground caribou (*R. t. groenlandicus*) in the NWT and on mountain caribou in the Yukon side of

the mountains, little effort and money has been spent on these animals in the NWT (Adamczewski and Veitch 1998). In the mid-1960s to early 1970s, Canadian Wildlife Service (CWS) biologists flew occasional surveys for woodland caribou and Dall's sheep in the Mackenzie Mountains, the results of which were sometimes put into unpublished 'in-house' file reports (e.g., Simmons 1969, Nielsen 1973) but sometimes were never compiled.

In 1983, George Collin of the University of Calgary completed his M.Sc. thesis on the 'Moose Horn River Herd', which summarized some of the earlier CWS surveys in the central Mackenzie Mountains along with his own research. Collin's thesis also proposed a management plan for the herd. This remains the most extensive examination of woodland caribou in the Mackenzie Mountains, NWT. Collin's research showed that the population exhibited high fertility, birth weights, calf survival, and growth rates, along with a greater body size [than other woodland caribou populations he examined] attained at an early age – all consistent with a high quality population occupying high quality seasonal ranges (Collin 1983). He also felt that overall there was no concern about over-harvest; however, localized heavy hunting pressure could lead to 'pockets' where over-harvest is a possibility.

In March 1998, Adamczewski and Veitch (1998) and again in March 1999, MacDonald and Veitch (1999) submitted funding proposals to the Sahtu Renewable Resources Board (SRRB) – the co-management board that is the "main instrument for wildlife management" within the Sahtu Settlement Area (Dept. of Indian Affairs and Northern Development 1993) - to initiate studies of woodland caribou in the central Mackenzie Mountains. The study was funded by the SRRB in each year and was designed to identify the identity of breeding populations of caribou, using a combination

of: 1) traditional knowledge, 2) a rutting ground survey in October, 3) a survey of the 8 licenced outfitters in the Mackenzie Mountains, 4) DNA finger-printing to determine relatedness of caribou from different geographic areas of the mountains (Paetkau et al. 1995; Nagy et al. 1999). Unfortunately, the study has had to be delayed due to turnovers in the Biologist position with the SRRB since March 1998.

On 05 August 1999, while flying an enforcement patrol survey by helicopter in the central Mackenzie Mountains, Keith Hickling (Manager, Wildlife – DRWED, Sahtu Region) observed a large aggregation of mountain caribou south of Hayhook Lake near the Redstone River (Figure 2). He informed us of his observation upon his return to Norman Wells in the evening of 05 August. On 06 August, we decided to use this unique opportunity to do a ground-based survey of caribou in the area.

The principal objectives of our survey were to:

1) estimate the numbers of caribou in the area
2) classify to broad age/sex groups as many caribou as possible,
3) obtain 30-40 fecal samples for parasite and disease assay at the Western College of Veterinary Medicine (University of Saskatchewan, Saskatoon, SK), and
4) photograph the aggregation.

## STUDY AREA AND METHODS

The survey was done on the east side of the Tsezotene Range between the Redstone and Ravens Throat rivers at approximately 63° 24' N, 126° 35' W (Figure 1). Elevation at our camp site was ca. 1360 m with a hill >1400 m to the west immediately behind the camp and a broad, sedge-shrub plain leading off to the east (Figure 2). The dominant shrubs in the plain were willow (*Salix* spp.) and dwarf birch (*Betula glandulosa*).

We were transported to and from the study site from Norman Wells by helicopter. We arrived at the site at 0830 h on 07 August 1999 and remained on site until 1830 h on 10 August 1999.

We used *Leica* 10x40 binoculars and *Kowa* 20-60x and *Leupold* 12-40x spotting scopes on *Slik* 500GFL tripods for classifications. *Nikon* F50 and F70 cameras, *Nikon* 300 mm and 500 mm telephoto lenses, and *Tamron* 28-200 mm zoom lenses were used for photography.

We classified caribou in three large groups that were all within 750 m of our campsite (Figure 2). Groups 1 and 2 were classified at distances of 50-200 m; Group 3 never came closer than 750 m and were not classified. Our classification categories were based on antler and body size: calf (<12-mo-old), adult female (cow), and adult male (bull). All classifications were done by the senior author. Classifications were done primarily while animals were moving, usually in single file. All classifications were recorded in field note books and later tabulated.

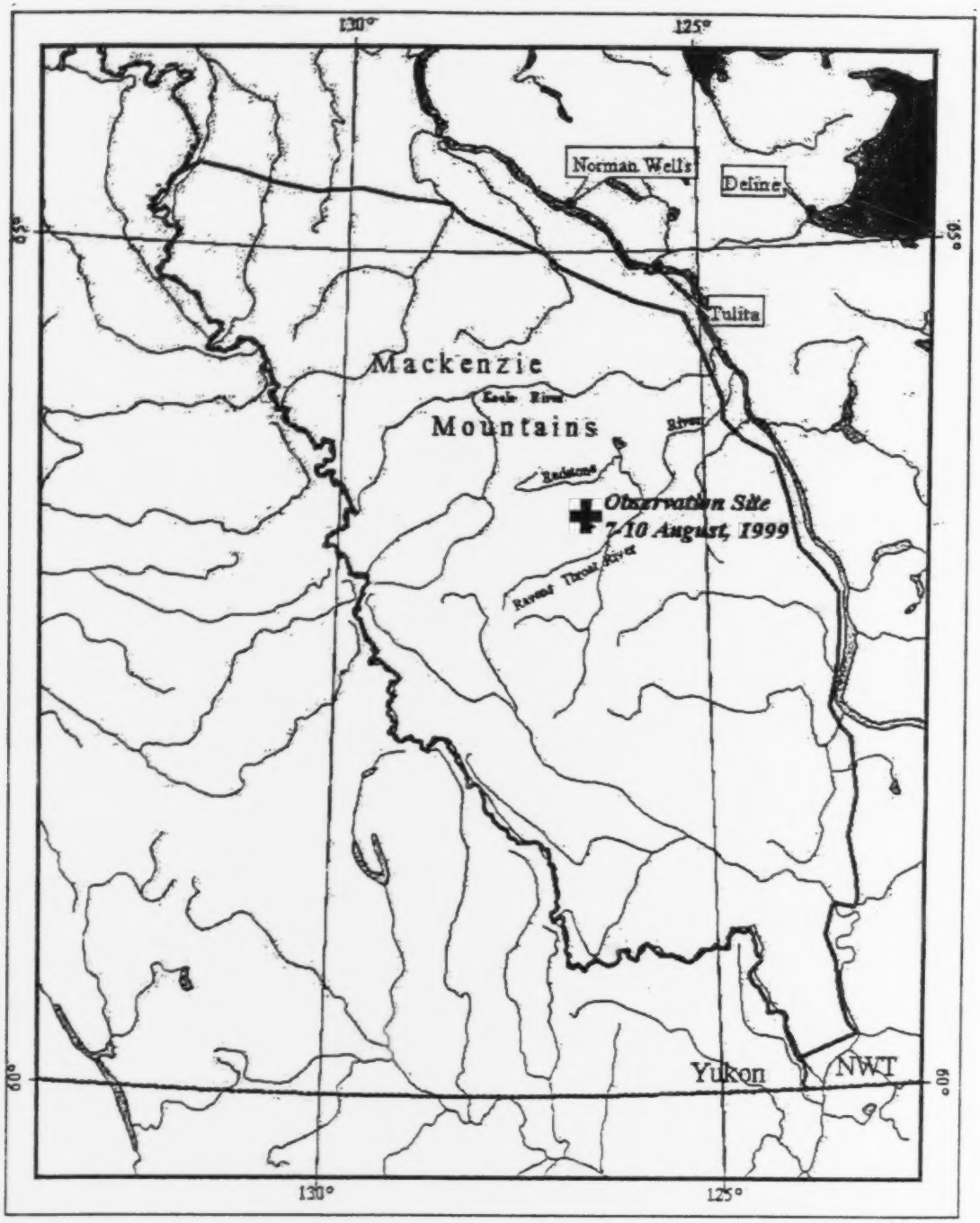


**Figure 1 Woodland caribou study area, Mackenzie Mountains, NWT, 07 - 10 Ausgust 1999**

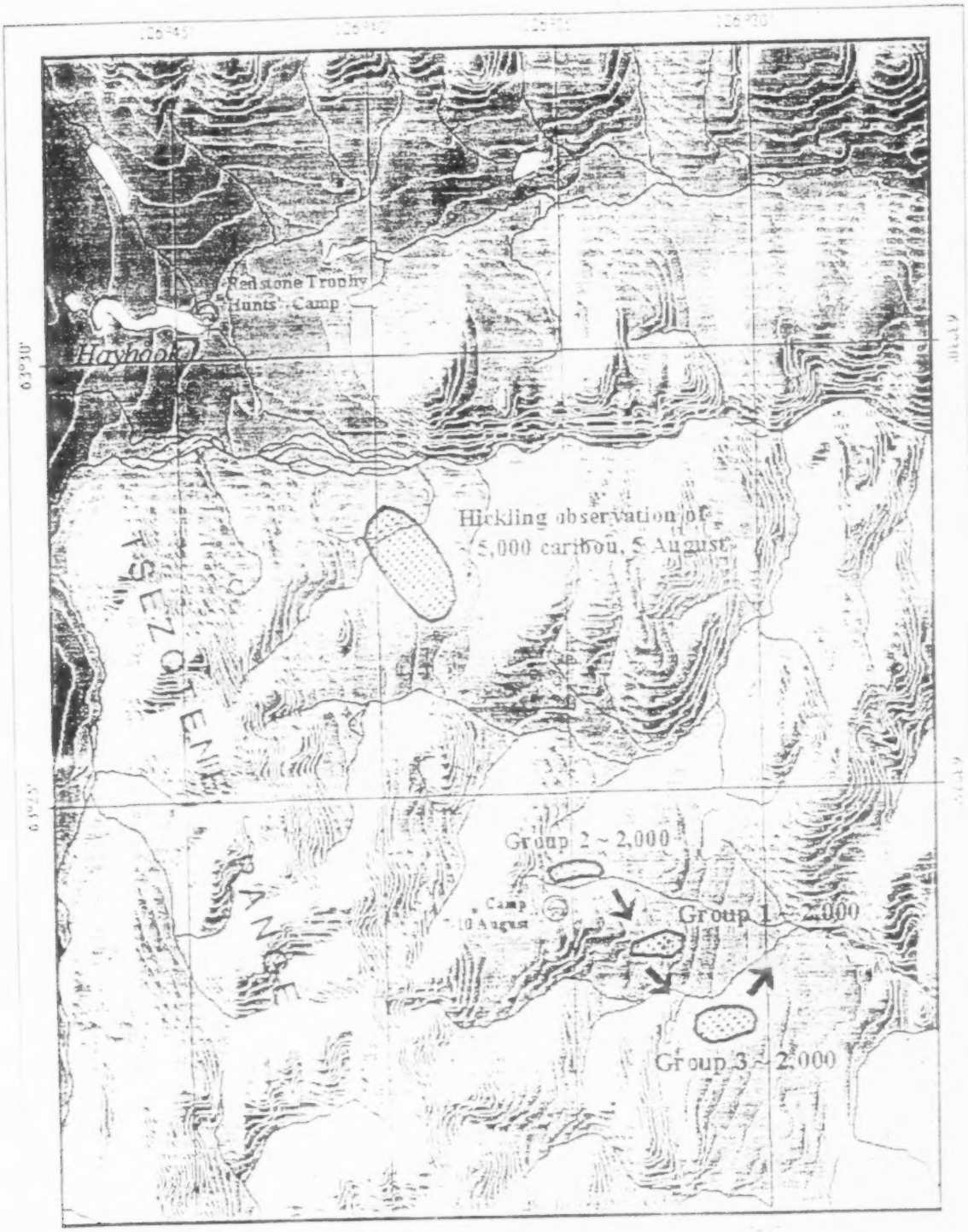


Figure 2. Woodland caribou observations - Tsezotene Range, August 1999.

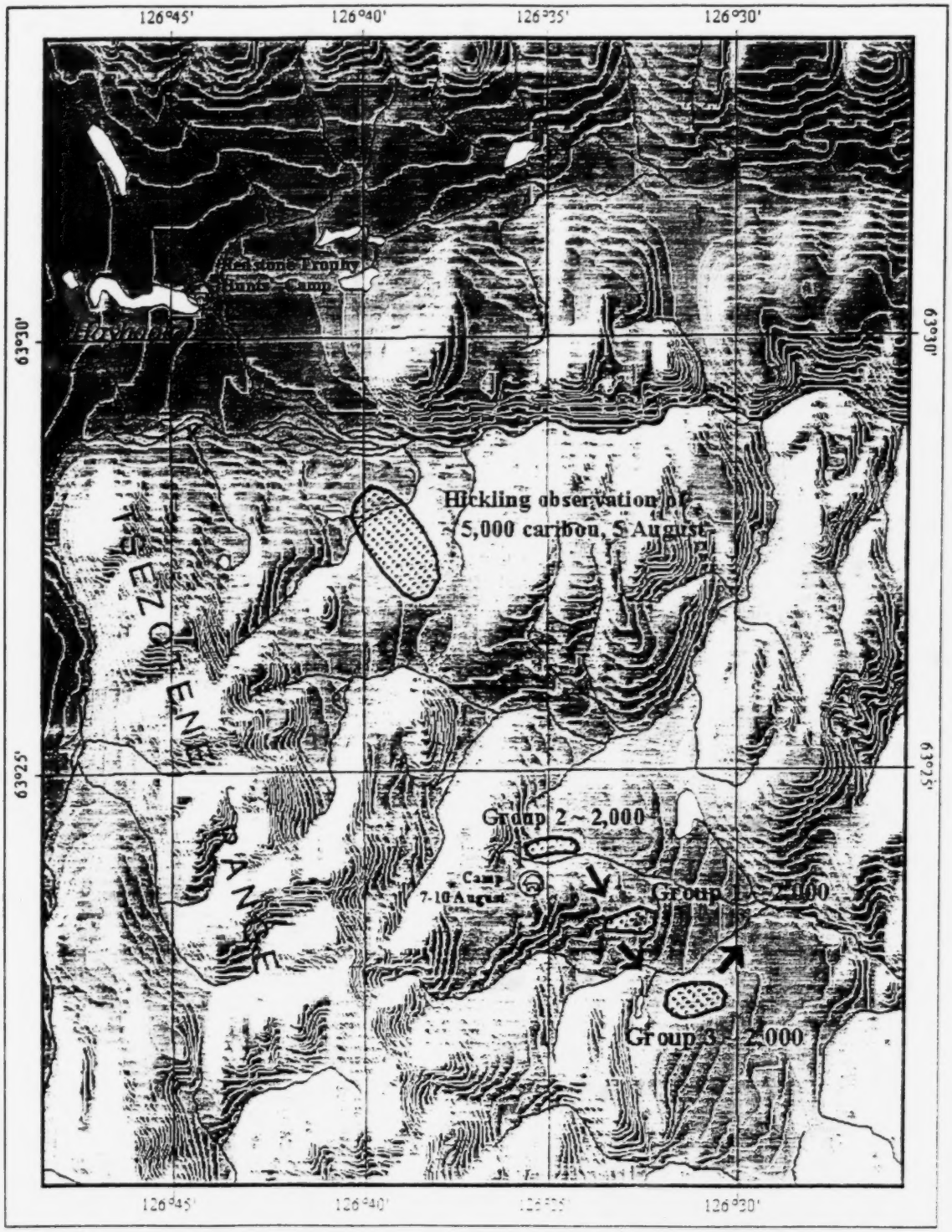


**Figure 2** Woodland caribou observations - Tsezotene Range. August 1999

## RESULTS

Over an approximate 12-h period on 07 August, we classified a total of 2659 caribou without known duplication. Weather conditions for classification were ideal: clear, sunny, light to moderate SE breeze, and about 15 to 20°C. Classifications of calves and large bulls was fairly straightforward; cows and small bulls were more problematic. Of the animals classified, 661 were males (24.9%), 1562 were females (58.7%), and 438 were calves (16.5%). This gives estimated age and sex ratios of 28 calves and 43 bulls per 100 cows, respectively (Table 1).

Insect harassment did not appear to be severe (Ion and Kershaw 1987) and the animals only shook themselves sporadically. Large males tended to aggregate together, as did cows with calves. Large males also tended to be on the outside of the groups. On three or four occasions, something startled the animals to cause brief, but massive, stampedes where all would break into a run. The distances covered during these instances tended to be very short (ca. 100-300 m).

The majority of animals had completely shed their winter coats and were in dark, chocolate-brown summer coats. A few of the larger males had begun producing a white mane around the neck. All antlers were in velvet and none had yet begun to shed velvet. Most animals appeared to be in quite good condition; however, we did note prominent ribs and backbones on some cows. A few (< 10) individuals were moderately to severely limping.

We observed considerable feeding on willow shrubs, especially along the banks of the small creek leading away from our campsite. The animals stripped the leaves from

branches and some appeared to be browsing the branch tips. Grazing on sedges was also observed.

By 2000 h, the two large groups that had been north and east of our location had moved SE to join the third group at the edge of treeline (Figure 2). Animals began moving into the trees following the river valley (a tributary of the Ravens Throat River) and most were out of sight by 2030 h.

Our only observation of a potential predator was a lone adult grizzly bear (*Ursus arctos horribilis*) feeding on the eastern edge of the broad shrub-sedge plain extending eastward from our campsite at about 2000 h. The bear showed no apparent interest in pursuing caribou and we last saw it about 2100 h.

Weather conditions deteriorated substantially during the night. By 0800 h on 08 August visibility was nil with low cloud, fog, drizzle, and rain. No caribou were observed. Poor weather persisted through the morning and early afternoon of 09 August. The cloud ceiling lifted slightly from 1530 h to 1730 h on 09 August and we made a short hike around the base of the hill against which we were camped. We observed a total of only 16 caribou (10 females and 6 calves) in one group. During this hike, we noticed heavy leaf stripping and branch tip browsing on willows in the area that had been occupied by the large groups of caribou on 07 August.

On 10 August we again experienced heavy rain and zero visibility until 1600 h when the cloud ceiling lifted slightly. We collected 40 caribou fecal samples from where caribou had been grouped on 07 August (i.e., samples were 3-days-old). We observed only 3 male caribou in the vicinity of our camp. We were picked up by helicopter at 1830 h and returned to Norman Wells.

**Table 1. Summary of population composition classifications of woodland caribou in the Mackenzie Mountains, Northwest Territories 1973-1999.**

| Year | Date | Type | No. Classified | Bulls per 100 Cows | Calves per 100 Cows |
|---|---|---|---|---|---|
| 1973[a] | 11-21 May | Air | 64 | 36 | 0 |
| 1973[a] | 22May-2 Jun | Air&Ground | 210 | 42 | 58 |
| 1973[a] | 3 Jun–30 Jun | Air&Ground | 396 | 60 | 77 |
| 1973[a] | 1 Jul-3 Sep | Air&Ground | 582 | 61 | 76 |
| 1980[b] | 5 Jun-14 Jun | Air&Ground | 918 | 8 | 57 |
| 1995[c] | 17 Jun | Air | 169 | 6 | 33 |
| 1995[d] | 15 Jul-30 Sep | Hunter Observations[e] | 23,200 | 42 | 43 |
| 1995[c] | Oct | Air | 813 | 37 | 17 |
| 1996[f] | 15 Jul-30 Sep | Hunter Observations[e] | 30,897 | 40 | 45 |
| 1996[c] | Oct | Air | 739 | 47 | 20 |
| 1997[g] | 15 Jul-30 Sep | Hunter Observations[e] | 32,883 | 21 | 36 |
| 1997[c] | Oct | Air | 733 | 32 | 26 |
| 1998[h] | 15 Jul-30 Sep | Hunter Observations[e] | 28,402 | 34 | 36 |
| **1999[i]** | **07 Aug** | **Ground** | **2659** | **43** | **28** |
| 1999[h] | 15 Jul-30 Sep | Hunter Observations[e] | 17,639 | 25 | 43 |

[a] Nielsen 1976
[b] Collin 1983
[c] Gullickson 1998
[d] Veitch and Popko 1996
[e] Classifications include duplicates (i.e., $\geq$ 2 hunters reporting same observation)
[f] Veitch and Popko 1997

[g] Veitch and Simmons 1998
[h] Veitch and Simmons unpublished data
[i] This study

## DISCUSSION

In 1973, Nielsen (1976) as reported in Collin (1983) classified caribou in the 'Moose Horn River Caribou Herd', which we assume is the same population that we observed and is now most commonly known as the Redstone Caribou Herd (Caribou Management Team 1996). He classified caribou from the air and from the ground during four caribou seasons - pre-calving, calving, post-calving, and summer (Table 1). From 01 July to 03 September, Nielsen classified 582 animals and estimated 61 bulls and 76 calves per 100 cows. Our bull and calf per 100 ratios were substantially different at 43 and 28, respectively (Table 1).

From 1995 to 1997, D. Gullickson and Parks Canada studied South Nahanni woodland caribou in the vicinity of Nahanni National Park and Reserve (Gullickson 1998). He flew three successive surveys (1995-97) to estimate the population composition of these caribou during the fall rut (October) and documented calf: 100 cow ratios of 17, 20, and 26 with totals of 733-813 caribou classified per survey.

The Yukon Department of Renewable Resources has established management guidelines for woodland caribou in that territory (Caribou Management Team 1996) and suggest that "a caribou population with 30-35 calves for every 100 cows in fall is generally stable to increasing. A successive number of years with less than 30 calves for every 100 cows indicates low recruitment and a declining population." Therefore, the calf: cow ratios documented by Gullickson (1998) in the South Nahanni and central Mackenzie Mountains in this study are a cause for concern and further investigation.

During 05-14 June 1980, Collin (1983) aerial and ground surveyed the Moose Horn River herd and observed a total of 1025 caribou, of which he classified 918

animals. He saw 41 bulls (4.5%), 516 cows (56.2%), 67 yearlings (7.3%), and 294 calves (32.0%). Collin noted considerable difficulty distinguishing young males (especially yearlings) from adult females during his classifications, especially from the air. He recommended ground-based over aerial classification.

Nielsen's 5 aerial and 4 ground classification surveys in 1973 included a total of 2569 caribou, of which 1317 went unclassified and 1252 were classified (Collin 1983). The largest number of animals for a single survey that Collin (1983) reports from Nielsen's work in 1973 is 1123 for an aerial survey flown on an unspecified date(s) between 01 Jul and 03 Sep 1973. This total may, in fact, include more than one flight to classify caribou. Ion and Kershaw (1989) studied selection of snowpatches as relief habitat in the MacMillan Pass area near the Yukon-NWT border in the westcentral Mackenzie Mountains. During early insect season (late June) they saw 'large groups' of up to 216 animals, but later in the insect season (July-August) groups rarely exceeded 45 animals. Therefore, it appears the aggregation of caribou we observed on 07 August 1999 is the largest ever recorded within the Mackenzie Mountains, NWT.

Collin (1983) documented annual herd distribution patterns for the herd and he noted (p. 70) that "bull groups appear to begin their easterly shift by early August in preparation for the rutting season. Concentrations of bull groups have been noted at this time... and on the southern slopes in the Hook [sic] Lake area (63° 27'N 126° 40'W)". He does not make any other reference to large aggregations of caribou in this vicinity, but does note that the area to the east near Wrigley/Drum Lake is a well-used wintering area.

The Redstone Herd is shared between the NWT and the Yukon Territory. This herd has never been systematically surveyed to estimate population size; however, the Yukon Dept. of Renewable Resources estimates that there are 5000-10,000 animals in

this herd (Caribou Management Team 1998), which ranges mostly in the NWT. Bergerud (1980) suggested a total population of 10,000 woodland caribou for the entire Mackenzie Mountains. From our singular observation on 07 August, it seems that the herd's size is most likely toward the upper end of the estimated range and planned future studies on the Redstone Herd by the Sahtu Renewable Resources Board and the DRWED-Sahtu Region (Adamczewski and Veitch 1998, MacDonald and Veitch 1999) should improve our population estimate for caribou in the Mackenzie Mountains of the NWT. The low calf: cow ratio from our survey may indicate that this herd is currently in decline.

We need to use recently developed microsatellite DNA analysis to determine herd identity for woodland caribou across their range in the Mackenzie Mountains (Paetkau et al. 1997, Nagy et al. 1999) so that research and management actions can be focused on appropriate herds.

## ACKNOWLEDGEMENTS

We would like to express our greatest appreciation to Keith Hickling (Manager, Wildlife – Sahtu Region, DRWED) who first located this aggregation of caribou and informed us of its presence. Norman Simmons (Acting Executive Director - Sahtu Renewable Resources Board) and Celina Stroeder (Superintendent – Sahtu Region, DRWED) ensured funding and supported our survey. Tim Simmons and Rob Carroll (*Canadian Helicopters Limited*, Norman Wells) were our pilots. Lana Robinson (GIS Specialist - Sahtu GIS Project, Norman Wells) prepared the figures.

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